6. $\frac{dx}{dt} = 2 + \sin(t^2)$

a) $\int_2^4 2 + \sin(t^2)\,dt + 3 = 6.942$

b) $y - 5 = m(x-3)$ $\qquad \frac{dy}{dx} = \frac{-6}{2+\sin 4}$

$y - 5 = \frac{-6}{2+\sin 4}(x-3)$

c) speed $= |v| = \sqrt{(2+\sin 4)^2 + (-6)^2} = 6.1274$

d) $\frac{\frac{dy}{dt}}{\frac{dx}{dt}} = (2t-1)$ so $\frac{dy}{dt} = (2t-1)\frac{dx}{dt}$

velocity vector: $\langle 2+\sin t^2,\ (2t-1)(2+\sin t^2) \rangle$

acceleration: $\langle 2t\cos t^2,\ (2t-1)(2t\cos t^2) + 2(2+\sin t^2) \rangle$

7. $\frac{dx}{dt} = \sin t^3$ $\qquad \frac{dy}{dt} = 3\cos t^2$ $\qquad \langle 4, 5 \rangle$

a) $y - 5 = \frac{3\cos 4}{\sin 8}(x-4)$

b) speed $= |v| = \sqrt{(3\cos 4)^2 + (\sin 8)^2}$ $\qquad 2.19638$

c) $\int_0^1 \sqrt{(\sin t^3)^2 + (3\cos t^2)^2} = 2.74144$

d) $\left\langle \int_2^3 \sin t^3\,dt,\ \int_2^3 3\cos t^2\,dt \right\rangle + \langle 4, 5 \rangle$

$\langle 4.004476,\ 5.724206 \rangle$